YASKAWA

YASKAWA AC Drive-Option Card

CANopen
Installation Manual

Type SI-S3

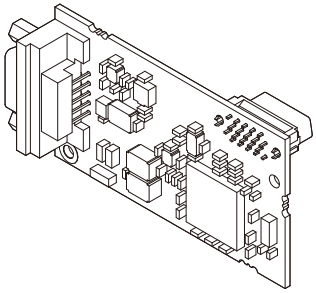
To properly use the product, read this manual thoroughly and retain for easy reference, inspection, and maintenance. Ensure the end user receives this manual.

安川インバータ オプションカード

CANopen 通信
取扱説明書

形式　SI-S3

製品を安全にお使い頂くために,この取扱説明書を必ずお読みください。
また,本書をお手元に保管していただくとともに,最終的に本製品をご使用になる
ユーザー様のお手元に確実に届けられるよう,お取り計らい願います。



MANUAL NO. TOBP C730600 45A

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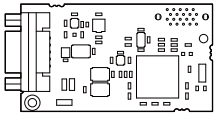
1 Preface and Safety

Yaskawa manufactures products used as components in a wide variety of industrial systems and equipment. The selection and application of Yaskawa products remain the responsibility of the equipment manufacturer or end user. Yaskawa accepts no responsibility for the way its products are incorporated into the final system design. Under no circumstances should any Yaskawa product be incorporated into any product or design as the exclusive or sole safety control. Without exception, all controls should be designed to detect faults dynamically and fail safely under all circumstances. All systems or equipment designed to incorporate a product manufactured by Yaskawa must be supplied to the end user with appropriate warnings and instructions as to the safe use and operation of that part. Any warnings provided by Yaskawa must be promptly provided to the end user. Yaskawa offers an express warranty only as to the quality of its products in conforming to standards and specifications published in the Yaskawa manual. NO OTHER WARRANTY, EXPRESS OR IMPLIED, IS OFFERED. Yaskawa assumes no liability for any personal injury, property damage, losses, or claims arising from misapplication of its products.

◆ Applicable Documentation

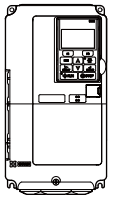
The following manuals are available for SI-S3 CANopen Option card:

Option Card

	**YASKAWA AC Drive-Option Card** **CANopen Installation Manual (this book)** **Manual No. : TOBPC73060045**
	Read this manual first. The installation manual is packaged with the CANopen Option and contains a basic overview of wiring, settings, functions, and fault diagnoses.
	YASKAWA AC Drive-Option Card **CANopen Technical Manual** **Manual No. : SIEPC73060045**
	The technical manual contains detailed information. To obtain the technical manual access these sites: Europe: http://www.yaskawa.eu.com Japan: http://www.e-mechatronics.com Other areas: contact a Yaskawa representative.

For the drive setup, refer to one of the documentation listed below.

Yaskawa Drive

	Refer to the manual of the drive this option card is being used with. The instruction manual for the drive covers basic installation, wiring, operation procedures, functions, troubleshooting, and maintenance information. It also includes important information on parameter settings and how to tune the drive. A Quick Start Guide is included with the drive. For the more detailed Technical Manual, visit Yaskawa's homepage. Europe: http://www.yaskawa.eu.com Japan: http://www.e-mechatronics.com Other areas: contact a Yaskawa representative

◆ Terms

Note: Indicates supplementary information that Yaskawa highly recommends be followed, even though equipment may not be at risk.

CANopen Option: Yaskawa AC Drive -SI-S3 CANopen option card

◆ Registered Trademarks

- CANopen is a registered trademark of the CAN in Automation (CiA).
- Other company names and product names listed in this manual are registered trademarks of those companies.

◆ Supplemental Safety Information

Read and understand this manual before installing, operating, or servicing this option card. The option card must be installed according to this manual and local codes.

The following conventions are used to indicate safety messages in this manual. Failure to heed these messages could result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.

⚠ DANGER

Indicates a hazardous situation, which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a hazardous situation, which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation, which, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates an equipment damage message.

■ General Safety

General Precautions

- The diagrams in this section may include drives without covers or safety shields to illustrate details. Be sure to reinstall covers or shields before operating any devices. The option board should be used according to the instructions described in this manual.
- Any illustrations, photographs, or examples used in this manual are provided as examples only and may not apply to all products to which this manual is applicable.
- The products and specifications described in this manual or the content and presentation of the manual may be changed without notice to improve the product and/or the manual.
- When ordering a new copy of the manual due to damage or loss, contact your Yaskawa representative or the nearest Yaskawa sales office and provide the manual number shown on the front cover.

⚠ DANGER

Heed the safety messages in this manual.

Failure to comply will result in death or serious injury.

The operating company is responsible for any injuries or equipment damage resulting from failure to heed the warnings in this manual.

NOTICE

Do not expose the drive to halogen group disinfectants.

Failure to comply may cause damage to the electrical components in the option card.

Do not pack the drive in wooden materials that have been fumigated or sterilized.

Do not sterilize the entire package after the product is packed.

Do not modify the drive circuitry.

Failure to comply could result in damage to the drive and will void warranty.

YASKAWA is not responsible for any modification of the product made by the user. This product must not be modified.

2 Product Overview

◆ About This Product

The CANopen Option Card (Model: SI-S3) is an option card designed to connect the Yaskawa AC drive to a CANopen network. Using this option card a CANopen master can

- Operate the drive
- Monitor the drive operation status
- Read or modify drive parameters

The CANopen Option supports the following communication profiles

- DS 301 Ver. 4.02
- DSP 402 Ver. 1.1 Velocity Mode

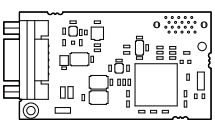
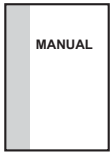
3 Receiving

Please perform the following tasks after receiving the CANopen Option:

- Inspect the CANopen Option for damage.
  If the CANopen Option appears damaged upon receipt, contact the shipper immediately.
- Verify receipt of the correct model by checking the information on the PCB (see ***Figure 1***).
- If you have received the wrong model or the CANopen Option does not function properly, contact your supplier.

◆ Contents and Packaging

Table 1 Contents of Package

Description:	Option Card	Ground Cable	Screws (M3)	LED Label	Installation Manual
					
Quantity:	1	1	3	1	1

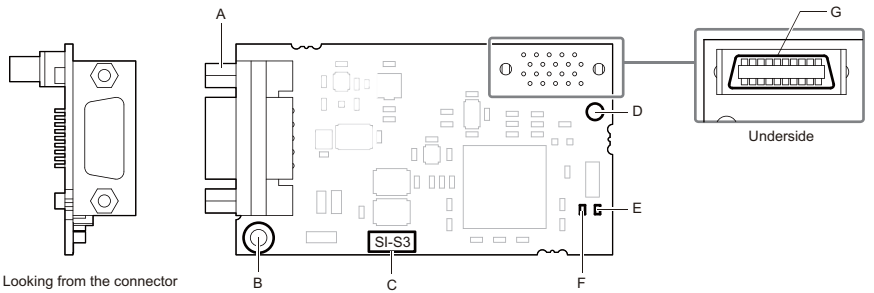
◆ Tool Requirements

A Phillips screwdriver PH1(#1) or PH2(#2) is required to install the CANopen option card.

Note: Tools required to prepare CANopen cables for wiring are not listed in this manual.

4 CANopen Option Components

◆ CANopen Option



A – Communication cable connector (9 pin D-sub)
B – Ground terminal (installation hole)
C – Model number
D – Installation hole
E – LED (RUN)
F – LED (ERR)
G – Connector (CN5)

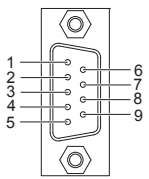
Figure 1 Option Card

For details on the LEDs, Refer to *CANopen Option LED Display on page 12*.

◆ Communication connector

The CANopen Option is connected to the network using a 9 pin D-sub connector. The pin assignment is explained in *Table 2*.

Table 2 Communication connector (9 pin D-sub)

CANopen Connector	Pin	Signal	Description
	1	–	–
	2	CAN_L	CAN_L bus line (dominant low)
	3	CAN_GND	CAN Ground
	4	–	–
	5	CAN_SHLD	CAN shield
	6	–	–
	7	CAN_H	CAN_H bus line (dominant high)
	8	–	–
	9	–	–
	–	CAN_SHLD	CAN shield

◆ CANopen Option LED Display

The CANopen Option has two LEDs that indicate the option card or communication status. The indications are conform with the DS303, Part 3: Indicator Specification.

■ Checking LED Operation

Table 3 LED Display

LED	Color	Display	Meaning
RUN	Green	On	Operational State
		Blinking	Pre-operational State
		Single flash	Stopped
ERR	Red	On	Bus off
		Blinking	Bus initialization failed (parameter setting error)
		Single flash	Fault has occurred Receiving CAN error frame (too many error frames)
		Double flash	Guard / Heartbeat event has occurred
		Off	Online

Figure 2 explains the indicator flash rates.

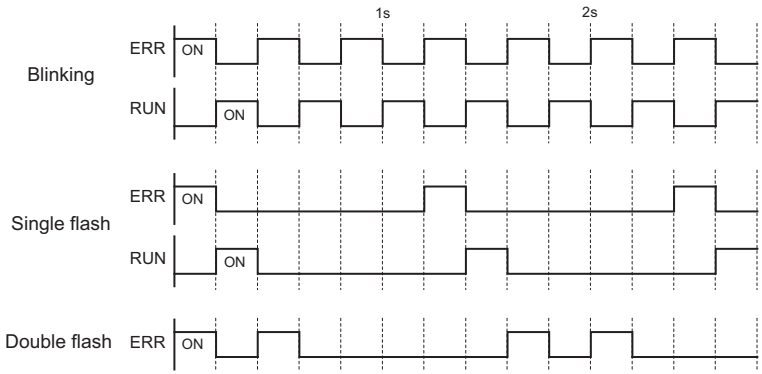


Figure 2 LED Flash Rates and Meaning

◆ Setting Node Address

Set the node address in the drive parameter F6-35. The node address can be set between 1 and 126 but has to be unique in the network. If the node address is set to 0, then the ERR light will flash, and AEr will appear on the keypad screen to indicate that an address setting error has occurred.

5 Installation Procedure

◆ Section Safety

⚠ DANGER

Electric Shock Hazard

Power to the drive must be shut off when installing this option card.

Even though the power has been shut off, voltage still remains in the drive's DC bus. Wait before removing the front cover once the drive has been turned off.

The CHARGE light on the drive will go out after voltage in the DC bus drops below 50 V, at which point it is safe to remove the front cover.

Due to the risk of electric shock, be sure that all LEDs have gone out and that the DC bus voltage has reached a safe level prior to performing any work on the drive.

⚠ WARNING

Electrical Shock Hazard

Do not remove the front cover of the drive while the power is on.

Failure to comply could result in death or serious injury.

The diagrams in this section may include drives without covers or safety shields to show details. Be sure to reinstall covers or shields before operating any devices. The option board should be used according to the instructions described in this manual.

Do not allow unqualified personnel to use equipment.

Failure to comply could result in death or serious injury.

Maintenance, inspection, and replacement of parts must be performed only by authorized personnel familiar with installation, adjustment, and maintenance of this product.

⚠ WARNING

Electrical Shock Hazard

Do not touch the option card while the power supply to the drive is switched on.

Failure to comply could result in death or serious injury.

Do not use damaged wires, place excessive stress on wiring, or damage the wire insulation.

Failure to comply could result in death or serious injury.

NOTICE

Damage to Equipment

Observe proper electrostatic discharge procedures (ESD) when handling the option card, drive, and circuit boards.

Failure to comply may result in ESD damage to circuitry.

Never shut the power off while the drive is outputting voltage.

Failure to comply may cause the application to operate incorrectly or damage the drive.

Do not operate damaged equipment.

Failure to comply may cause further damage to the equipment.

Do not connect or operate any equipment with visible damage or missing parts.

Tighten all terminal screws to the specified tightening torque.

Loose electrical connections could result in death or serious injury by fire due to overheating of electrical connections.

Do not use unshielded cable for control wiring.

Failure to comply may cause electrical interference resulting in poor system performance.

Use shielded twisted-pair wires and ground the shield to the ground terminal of the drive.

NOTICE

Damage to Equipment

Properly connect all pins and connectors.

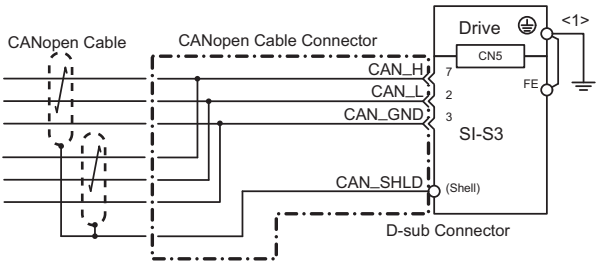
Failure to comply may prevent proper operation and possibly damage equipment.

Check wiring to ensure that all connections are correct after installing the option card and connecting any other devices.

Failure to comply may result in damage to the option card.

◆ Wiring the Network Cable Connectors

The CANopen option must be connected to the network using a 9 pin D-sub connector wired like shown in ***Figure 3***.

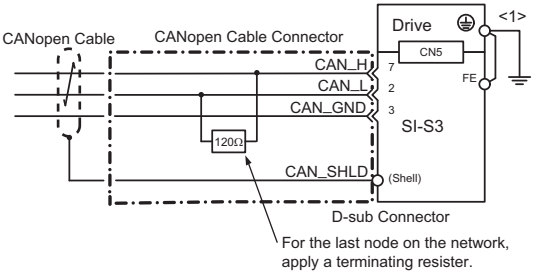


<1> The FE terminal on the CANopen Option must be connected to the drive ground terminal using the delivered ground wire.

Figure 3 Wiring Diagram

◆ Network Termination

Both ends of a CANopen network have to be terminated with a 120 Ω resistor. As the CANopen Option has no build in termination resistor, make sure to apply a termination resistor as shown in ***Figure 4*** if the CANopen Option is the last node in the network.



<1> The FE terminal on the CANopen Option must be connected to the drive ground terminal using the delivered ground wire.

Figure 4 Termination Resistor Installation

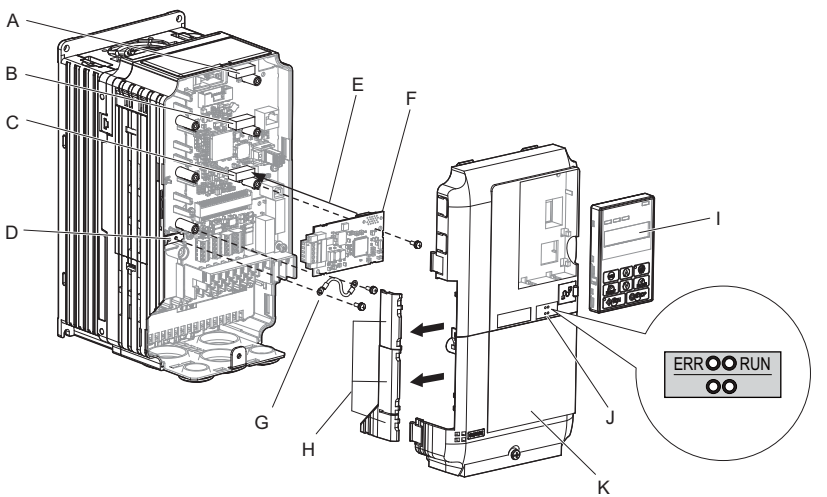
◆ Prior to Installing the Option Card

Prior to installing the CANopen Option, wire the drive and make necessary connections to the drive terminals. For more information on wiring and connecting the drive, refer to the technical manual for the drive the CANopen option card is connected to. Verify that the drive runs normally without the option installed.

◆ Installing the Option Card

1. Shut off power to the drive, wait the appropriate amount of time for voltage to dissipate, then remove the operator and front cover. Refer to the drive technical manual for direction on removing the front cover.
2. Insert the CN5 connector on the option card into the CN5-A connector on the drive, then fasten it into place using one of the screws included with the option card. Connect the ground lead line to the ground terminal using one of the screws delivered with the option card.

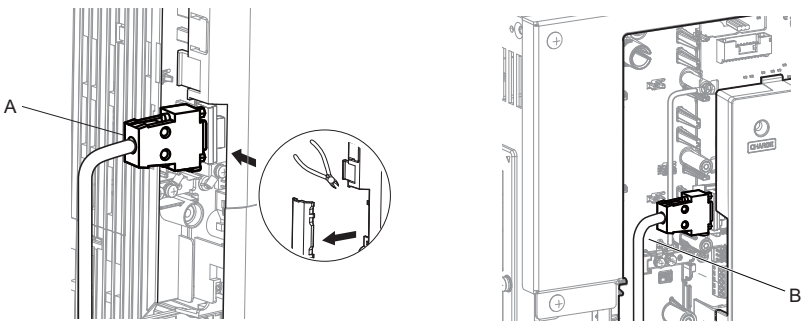
Note: There are only two screw holes on the drive for ground terminals. If three option cards are connected, two of the lead lines will need to share the same ground terminal.



A – Connector CN5-C
B – Connector CN5-B
C – Connector CN5-A
D – Drive grounding terminal (FE)
E – Insert connector CN5 here
F – Option card
G – Lead line
H – Use wire cutters to create an opening for cable lines
I – Operator
J – LED label
K – Front cover

Figure 5 Installing the Option Card

3. Prepare network cable connectors like explained in ***Figure 3*** on page ***16***. Apply a termination resistor like explained in ***Figure 4*** on page ***17*** if the drive is the last node in the network.
In the drives CIMR-A□2A0004 to 0040 and 4A0002 to 0023 the network cable must be routed to the outside through the drive top cover. Use a pair of wire cutters to cut out the perforated openings at the left side of the top cover. Make sure no sharp edges that can damage the cable remain.
Drives 2A0056 to 0211, 4A0031 to 0165 have enough space to keep all wiring inside the unit.



A – Opening for cable lines (CIMR-A□2A0004 to 0040, 4A0002 to 0023)

B – Space for wiring (CIMR-A□2A0056 to 0211, 4A0031 to 0165)

Figure 6 Wiring space

4. Plug in the network cable connector and fix it using the screws at the side of connector.

5. Place the front cover back onto the drive as it was before.

Note: **1.** Take care when wiring the option card so that the front cover easily fits back onto the drive.
2. Install Cable Cover option to maintain the drive Enclosure Type.

6. Attach the LED label packaged with the option card as shown in ***Figure 5***.

7. Switch on the drive power supply.
An “AEr” Alarm message indicating that the node address is set to 0 will appear on the display. Set the node address in parameter F6-35. Set the communication speed in parameter F6-36.

8. Cycle the power supply to activate the changed settings. Installation completed.

◆ Communication Cable Specifications

To ensure proper performance Yaskawa recommends using CANopen dedicated communication cables only.

◆ EDS Files

For easy network implementation of drives equipped with a CANopen Option, an EDS file can be obtained from:

Europe: http://www.yaskawa.eu.com

Japan: http://www.e-mechatronics.com

Other areas: contact a Yaskawa representative

6 CANopen Option Drive Parameters

Confirm the proper setting of all parameters in ***Table 4*** before starting network communications.

Table 4 Parameter Settings

No.	Name	Description	Default
b1-01 <1>	Frequency Reference Selection	Selects the frequency reference input source 0: Operator - Digital preset speed d1-01 to d1-17 1: Terminals - Analog input terminals 2: MEMOBUS/Modbus communications 3: Option card 4: Pulse Input (Terminal RP)	1
b1-02 <1>	Run Command Selection	Selects the run command input source 0: Digital Operator - RUN and STOP keys 1: Digital input terminals S☐ 2: MEMOBUS/Modbus communications 3: Option card	1
E2-04 <2>	Motor 1 Motor Poles	Set the number of motor poles described on the motor nameplate. 2 to 48	4
F6-01	Operation Selection after Communications Error	Determines drive response when a bUS error is detected during communications with the CANopen Option 0: Ramp to Stop 1: Coast to Stop 2: Fast-Stop 3: Alarm Only <3>	1
F6-02	External Fault Detection Conditions (EF0)	Sets the condition for external fault detection (EF0) 0: Always detected 1: Detected only during operation	0
F6-03	Stopping Method for External Fault from Communication Option Board	Determines drive response for external fault input (EF0) detection during CANopen communication 0: Ramp to Stop 1: Coast to Stop 2: Fast-Stop 3: Alarm Only <3>	1
F6-06 <4>	Torque Reference/Torque Limit selection from Communications Option	0: Torque reference/torque limit via network communications are disabled. 1: Torque reference/torque limit via network communications are enabled. <5>	0
F6-07	NetRef/ComRef Selection Function	0: Multi-step speed reference disabled (F7 mode) 1: Multi-step speed reference allowed (V7 mode)	0

No.	Name	Description	Default
F6-08	Reset Communication Related Parameters	Determines if communication-related parameters are set back to their original default values when the drive is initialized. 0: Do not reset F6-☐☐ and F7-☐☐ parameters when the drive is initialized using parameter A1-03. 1: Rest F6-☐☐ and F7-☐☐ parameters when the drive is initialized using parameter A1-03. **Note:** Setting this parameter does not affect communication-related parameters. Setting this parameter only determines if communication-related parameters (F6-☐☐ and F7-☐☐) are also reset when A1-03 is used to initialize the drive.	0
F6-35 <6>	Node Address	0 to 126	0
F6-36 <6>	Communication Speed	0: Disabled 1: 10 kbps 2: 20 kbps 3: 50 kbps 4: 125 kbps 5: 250 kbps 6: 500 kbps 7: 800 kbps 8: 1 Mbps	6
o1-03 <2> <7>	Digital Operator Display Selection	Sets the units to display the frequency reference and output frequency. 0: 0.01 Hz 1: 0.01% (100% = E1-04) 2: r/min (enter the number of motor poles into E2-04/E4-04/E5-04) 3: User defined by parameters o1-10 and o1-11	0

<1> To start and stop the drive from a CANopen master device using serial communications, set b1-02 to 3. To control the frequency reference of the drive via the master device, set b1-01 to 3.
<2> E2-04 is necessary to set up when the Drive Profile DSP402 objects are used.
<3> If set to 3, then the drive will continue to operate when an EF0 fault is detected. Take proper safety measures, such as installing an emergency stop switch.
<4> This parameter might not appear in certain drives. Furthermore its availability is limited to depending on the control mode selection. For details refer to the technical manual of the drive the option card is used with.
<5> If the drive is set to receive the torque reference/limit from the network (F6-06 = 1) make sure the value is set appropriately by the controller. If no torque reference/limit value is entered the motor will not produce torque.
<6> Power must be cycled in order for any setting changes to take affect.
<7> All node addresses must be unique. If a node address is set to 0, then the ERR light will flash, and AEr will appear on the keypad screen to indicate that an address setting error has occurred.
<8> Changing o1-03 changes the units for input object 2010H (frequency reference), output object 2110H (output frequency) and 2200H (motor speed).

7 Communication Objects Overview

The following tables list up the communication objects supported by the CANopen option card. For details about the object content refer to the CANopen Option Technical Manual.

◆ Communication Objects (DS 301)

Index (Hex)	Name
1000	Device Type
1001	Error Register
1003	Pre-defined Error Field
1005	COB-ID SYNC Message
1008	Manufacturer Device Name
1009	Manufacturer Hardware Version
100A	Manufacturer Software Version
100C	Guard Time
100D	Life Time Factor
100E	Node Guarding Identifier
1010	Store Parameters
1011	Restore Default Parameters
1014	COB-ID Emergency Object
1016	Consumer Heartbeat Time
1017	Producer Heartbeat Time
1018	Identity Object

◆ Manufacturer Specific Objects (DS 301)

Index (Hex)	Name
2000	Operation Command
2010	Speed Command
2020	Torque Limit
2030	Torque Compensation
2040	MEMOBUS/Modbus Read Command
2050	MEMOBUS/Modbus Write Command
2060	MEMOBUS/Modbus Not Limited Enter Command
2070	MEMOBUS/Modbus Limited Enter Command
2100	Drive Status
2110	Output Frequency
2120	Output Current
2130	Output Torque
2140	MEMOBUS/Modbus Read Command Response
2150	MEMOBUS/Modbus Write Command Response
2160	MEMOBUS/Modbus Not Limited Enter Command Response
2200	Motor Speed

◆ Drives and Motion Profile (DSP 402)

The drive supports the Drive and Motion Profile DSP 402 Velocity Mode. Before using the Velocity Mode objects the following parameters have to be set up in the drive:

- The motor pole number must be set up in E2-04.
- The frequency reference and output frequency display unit has to be set to r/min by setting parameter o1-03 = 2.

If these settings are not done properly, the Velocity Mode objects can not be used or deliver wrong data.

■ Common Entries

Index (Hex)	Name
60FD	Digital Inputs *<1>*
60FE	Digital Outputs *<2>*

<1> YASKAWA specifies this object as the drive digital output monitor. (Input from the network)
<2> YASKAWA specifies this object as the drive digital inputs. (Output to the network)

■ Device Control

Index (Hex)	Name
6040	Controlword
6041	Statusword
6061	Modes of operation display

■ Velocity Mode

Index (Hex)	Name
6042	vl target velocity
6043	vl velocity demand
6044	vl control effort
6046	vl velocity min max amount
6048	vl velocity acceleration
6049	vl velocity deceleration
604A	vl velocity quick stop
604C	vl dimension factor
604D	vl pole number

◆ PDO Mapping

The drive supports 15 Receive and 16 Transmit PDO's. The tables below show the default PDO Mapping.

■ Receive PDO

PDO number	Receive PDO Parameter		Receive PDO Mapping	
	COB-ID (Hex)	Index (Hex)	Mapped objects (Hex)	Index (Hex)
1	200 + Node ID	1400	Subindex 1: 6040	1600
2	300 + Node ID	1401	Subindex 1: 6040 Subindex 2: 6060	1601
6	Not assigned	1405	Subindex 1: 6040 Subindex 2: 6042	1605
7	Not assigned	1406	Subindex 1: 6040 Subindex 2: 60FE sub1	1606
8	Not assigned	1407	Subindex 1: 6040 Subindex 2: 6060	1607
21	Not assigned	1414	Subindex 1: 6048 sub1 Subindex 2: 6048 sub2	1614
22	Not assigned	1415	Subindex 1: 6049 sub1 Subindex 2: 6049 sub2	1615
23	Not assigned	1416	Subindex 1: 604A sub1 Subindex 2: 604A sub2	1616
24	Not assigned	1417	Subindex 1: 604C sub1 Subindex 2: 604C sub2	1617
36	Not assigned	1423	Subindex 1: 2000	1623
37	Not assigned	1424	Subindex 1: 2010	1624
38	Not assigned	1425	Subindex 1: 2020	1625
39	Not assigned	1426	Subindex 1: 2030	1626
40	Not assigned	1427	Subindex 1: 2040 sub1	1627
41	Not assigned	1428	Subindex 1: 2050 sub1	1628

■ Transmit PDO

PDO number	Transmit PDO Parameter		Transmit PDO Mapping	
	COB-ID (Hex)	Index (Hex)	Mapped objects (Hex)	Index (Hex)
1	180 + Node ID	1800	Subindex 1: 6041	1A00
2	280 + Node ID	1801	Subindex 1: 6041 Subindex 2: 6061	1A01
6	Not assigned	1805	Subindex 1: 6041 Subindex 2: 6044	1A05
7	Not assigned	1806	Subindex 1: 6041 Subindex 2: 60FD	1A06
21	Not assigned	1814	Subindex 1: 6042	1A14
22	Not assigned	1815	Subindex 1: 6043	1A15
23	Not assigned	1816	Subindex 1: 6048 sub1 Subindex 2: 6048 sub2	1A16
24	Not assigned	1817	Subindex 1: 6049 sub1 Subindex 2: 6049 sub2	1A17
25	Not assigned	1818	Subindex 1: 604A sub1 Subindex 2: 604A sub2	1A18
26	Not assigned	1819	Subindex 1: 604C sub1 Subindex 2: 604C sub2	1A19
36	Not assigned	1823	Subindex 1: 2100	1A23
37	Not assigned	1824	Subindex 1: 2110	1A24
38	Not assigned	1825	Subindex 1: 2120	1A25
39	Not assigned	1826	Subindex 1: 2130	1A26
40	Not assigned	1827	Subindex 1: 2140 sub1	1A27
41	Not assigned	1828	Subindex 1: 2150 sub1	1A28

8 Fault Diagnosis and Possible Solutions

◆ Drive-Side Error Codes

Drive-side error codes appear on the drives digital operator. Causes of the errors and corrective actions are listed in ***Table 5*** and ***Table 6***. For additional error codes, refer to the technical manual for the drive.

bUS (CANopen Option Communication Error) and EF0 (External Fault Input from the CANopen Option) may appear as an alarm or a fault. If they occur as an alarm the "ALM" LED on the drive digital operator blinks and the alarm code flashes in the display. When they occur as a fault the “ALM” LED lights and the display shows the fault code.

If communication stops while the drive is running, check the following items:

- Is the CANopen Option properly installed?
- Is the communication line properly connected to the CANopen Option? Is it loose?
- Is the controller program working? Has the controller CPU stopped?
- Did a momentary power loss interrupt communications?

■ Faults

Table 5 lists up possible faults when using a communication option board. The drives fault contact will close in case that one of these faults occurs.

Table 5 Fault Display and Possible Solutions

Digital Operator Display		Fault Name
bUS	bUS	CANopen Option Communication Error
		After establishing initial communication, the connection was lost. Only detected when the run command or frequency reference is assigned to the option (b1-01=3 or b1-02=3).
Cause		**Possible Solution**
Master controller (PLC) has stopped communicating.		Check for faulty wiring. ⇒ Correct any wiring problems.
Communication cable is not connected properly.		
A data error occurred due to noise.		Check the various options available to minimize the effects of noise. ⇒ Take steps to counteract noise in the control circuit wiring, main circuit lines, and ground wiring. ⇒ If a magnetic contactor is identified as a source of noise, install a surge absorber to the contactor coil. ⇒ Make sure the cable used fulfills the CANopen requirements. Ground the shield on the controller side and on the CANopen Option side.
CANopen Option is damaged.		⇒ If there are no problems with the wiring and the error continues to occur, replace the CANopen Option.

Digital Operator Display		Fault Name
EF0	EF0	External Fault Input from CANopen Option The alarm function for an external device has been triggered.
Cause		**Possible Solution**
An external fault is being sent from the upper controller (PLC).		⇒ Remove the cause of the external fault. ⇒ Reset the external fault input from the upper controller (PLC) device.
Problem with the upper controller (PLC) program.		⇒ Check the program used by the upper controller (PLC) and make the appropriate corrections.

Digital Operator Display		Fault Name
oFA00	oFA00	Option Card Fault at Connector CN5-A The drive dose not support the option board plugged into port CN5-A.
Cause		**Possible Solution**
Non-compatible option connected to the drive.		⇒ Check the drive option board compatibility. Replace the option card if the fault persists even though the drive should support it.

Digital Operator Display		Fault Name
oFA01	oFA01	Option Card Fault at Connector CN5-A Option card is not properly connected.
Cause		**Possible Solution**
Problem with the connectors between the drive and CANopen Option.		⇒ Turn the power off and check the connectors between the drive and CANopen Option.

Digital Operator Display		Fault Name
oFA30 to oFA43	oFA30 to oFA43	Option Card Fault at Connector CN5-A Communication ID error
Cause		**Possible Solution**
Option card hardware fault		⇒ Replace the CANopen Option. Contact Yaskawa for assistance.

Digital Operator Display		Fault Name
oFb00	oFb00	Option Card Fault at Connector CN5-B
		Non-compatible option card is connected.
Cause		**Possible Solution**
The CANopen option card has been plugged into option port CN5-B.		⇒ Always use option port CN5-A for communication option cards.

Digital Operator Display		Fault Name
oFb02	oFb02	Option Card Fault at Connector CN5-B
		Two of the same option cards are connected at the same time.
Cause		**Possible Solution**
Two or more input option cards (analog, digital or communication) have been connected to the drive at the same time.		⇒ Use either an analog input option AI-A3 or a digital input option DI-A3 or a communication option card. Never use two of these cards at the same time.

Digital Operator Display		Fault Name
oFc00	oFc00	Option Card Fault at Connector CN5-C
		Non-compatible option card is connected.
Cause		**Possible Solution**
The CANopen option card has been plugged into option port CN5-C.		⇒ Always use option port CN5-A for communication option cards.

Digital Operator Display		Fault Name
oFc02	oFc02	Option Card Fault at Connector CN5-C
		Two of the same option cards are connected at the same time.
Cause		**Possible Solution**
Two or more input option cards (analog, digital or communication) have been connected to the drive at the same time.		⇒ Use either an analog input option AI-A3 or a digital input option DI-A3 or a communication option card. Never use two of these cards at the same time.

■ Minor Faults and Alarms

Table 6 lists up alarms that might occur during operation using a communication option board. If a multi function digital output of the drive is programmed for H2-□□ = 10, the output will close if these alarms occur.

Table 6 Alarm Codes and Possible Solutions

Digital Operator Display		Minor Fault Name
AEr	AEr	Setting Address Error
		CANopen Option is set to an address outside the allowable setting range.
Cause		**Possible Solution**
Address outside the specified address range		⇒ Set F6-35 to an address within the specified range.

Digital Operator Display		Minor Fault Name
CALL	CALL	Serial Communication Transmission Error
		Communication has not yet been established.
Cause		**Possible Solution**
Communication wiring is faulty, there is a short circuit, or something is not connected properly.		Check for wiring errors. ⇒ Correct the wiring. ⇒ Remove and ground shorts and reconnect loose wires.
Programming error on the master side		⇒ Check communications at start-up and correct programming errors. SI-S3 has no self check function.
Communication circuitry is damaged.		⇒ Replace the drive if the fault continues to occur.

Operator Display		Minor Fault Name
EEP	EEP	EEPROM Error
		EEPROM checksum error
Cause		**Possible Solution**
EEPROM checksum error		If these errors occur, the object dictionary will be reset to its default values. => After the object dictionary has been changed and object dictionary contents are then changed, execute a Store Parameter command (Index = 1010H). => If the object dictionary has not been changed, execute a Restore Parameter command (Index = 1011H).

9 Specifications

◆ Specifications

Table 7 Option Card Specifications

Items	Specifications
Model	SI-S3
Communication Profile	DS 301 Ver. 4.02 DSP 402 Ver. 1.1 Velocity Mode
Connector	9 pin D-sub connector (#4/40 UNC thread)
Communications Speed	10 kbps to 1 Mbps
Ambient Temperature	–10 °C to +50 °C
Humidity	up to 95% RH (no condensation)
Storage Temperature	–20 °C to +60 °C (allowed for short-term transport of the product)
Area of Use	Indoor (free of corrosive gas, airborne particles, etc.)
Altitude	up to 1000 m

◆ Revision History

The revision dates and the numbers of the revised manuals appear on the bottom of the back cover.

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YASKAWA AC Drive-Option Card

CANopen
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